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SOCIAL BEHAVIOUR OF THE JACKDAW, *CORVUS MONEDULA*, IN RELATION TO ITS NICHE

by

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(With 14 Figures and 1 Plate)
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I. INTRODUCTION

1. AIMS OF THE STUDY

LORENZ' classical study (1931) on the social organization of jackdaws, *Corvus monedula*, which was based on his intimate knowledge of a group of semi-captive and tame birds, has not so far been followed up by a study on

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the social organization of wild jackdaws. The present study originated from a wish to fill this gap. Functional questions about the social organization, which should be studied in a natural situation as much as possible, were particularly emphasized.

During the last few years the wealth of information produced by field studies on social organization of birds and mammals have produced a growing awareness that almost all characters of a species form an adaptive complex (HINDE, 1974). Behaviour and structure of individuals, and aspects of group composition are adaptively interlinked. A study of functions, therefore, requires a very comprehensive approach. Although, of course, far from dealing with all relevant subjects, this study touches upon many aspects of, in particular, the social behaviour of jackdaws in relation to its niche, in an attempt to unravel its adaptive significance.

After a description of the study area and the methods used, some general information on the jackdaw population in the study area is given in Chapter II. This includes such diverse aspects as daily and annual activity cycles, dispersal patterns in breeding and feeding, population demography and breeding biology.

In Chapter III a detailed description and analysis is given of the social relationships between individually known jackdaws of a particular colony. Since LORENZ (1931) showed that the dominance hierarchy played a pervasive and dominant role in the social relationships among his birds, particular attention has been paid to this feature of the social organisation in the wild birds. One of LORENZ findings was that females, after pair formation, attain the rank of their mate. This dependent rank of the females poses a number of interesting questions such as: is the same true in free-living jackdaws and, if so, how do the females attain the rank of their mate and how does the dependent rank of the females affect the structure of the rank-order?

Jackdaws feed in flocks. LOCKIE (1956) argued that in feeding flocks of jackdaws (and rooks) a dominance hierarchy may have survival value: the dominant bird can have his way and the subordinate can avoid certain defeat and take his chances of finding food elsewhere. Since a considerable proportion of the jackdaw population in the study area was colour-banded and as the dominance relationships were to a large extent known, it seemed worthwhile to attempt to determine the possible effects of the dominance hierarchy on the flocking behaviour and feeding success of individually known birds. This will be examined in Chapter IV.

Aggressive interactions in feeding flocks may be expected to lead to scattering of individuals. Still, flock feeding does exist in jackdaws and the

two main selection pressures that have been suggested as leading to flock feeding in birds are defence against predators, and increased feeding efficiency.

Observations on the potential selection pressures exerted by predatory birds and mammals on feeding jackdaws, are largely lacking. During the course of this study, however, a related type of pressure possibly selecting for flock feeding in the jackdaws presented itself: interspecific aggression by the closely related and sympatric carrion crow (*Corvus corone*). The nature and consequences of interspecific aggression by carrion crows against feeding jackdaws, sometimes showing properties of straightforward predation, are discussed in Chapter V.

In Chapter VI a possible advantage of flocking in increasing the feeding efficiency of individuals will be investigated. One of the ways in which the feeding efficiency of flock members may be enhanced is by learning from one another about potential food sources. Social learning has been demonstrated in many animals in a variety of contexts, but most often in captivity. Moreover, hardly ever has the influence of the social relationships between the animals involved been taken into account. I have carried out a number of experiments designed to test whether and how free-living jackdaws may profit from one another by learning to exploit new food sources.

Chapter VII deals with the functional aspects related to nesting. Jackdaws are hole-nesters which depend to a large extent upon existing holes. Holes may be present clumped or scattered. As a rule no two holes will be identical and the number of suitable holes is likely to be limited. How do the jackdaws find the most suitable holes and how do they obtain and maintain nest-hole ownership? These questions are examined, along with individual differences in the success of obtaining suitable holes.

In Chapter VIII possible benefits to be gained by individuals nesting in holes in relation to external factors are investigated. As in flock feeding, there are again some indications that the interspecific aggression by the carrion crow may be a strong pressure selecting for hole-nesting in jackdaws.

Finally, in the discussion (Chapter IX) an attempt to synthesize the data will be made, leading to a speculation on the evolution of the social behaviour in jackdaws.

2. STUDY AREA AND METHODS

The field work was concentrated in an area of approximately 5 square kilometers surrounding the Groningen University's Zoological Laboratory in the village of Haren in the northern Netherlands (Fig. 1). This area includes the northern part of the village centered around the Botanical Gardens of the University and the sport